

Applicant:
For:

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NON-INVASIVE POWERLINE
COMMUNICATIONS SYSTEM

1 *Sub a. >* 1. A non-invasive powerline communications system, comprising:
2 means for generating communication signals at a first location for
3 transmission on a powerline;
4 means for reactively coupling the communication signals to said
5 powerline; and
6 means for receiving said communication signals at a second
7 location.

1 2. The non-invasive powerline communications system of claim 1 in
2 which said means for generating includes a first communications device.

1 3. The non-invasive powerline communications system of claim 1 in
2 which said means for reactively coupling includes means for inductively coupling said
3 communication signals to said powerline.

1 4. The non-invasive powerline communications system of claim 3 in
2 which said means for inductively coupling includes a communications core element
3 disposed about the powerline and a plurality of windings disposed about said
4 communications core element for coupling said communication signals to said powerline.

1 5. The non-invasive powerline communications system of claim 1 in
2 which said means for reactively coupling includes means for capacitively coupling said
3 communication signals to said powerline.

1 6. The non-invasive powerline communications system of claim 5 in
2 which said means for capacitively coupling includes a capacitor having inner and outer
3 spaced plates located proximate said powerline and a dielectric disposed between said
4 plates for capacitively coupling said communication signals to said powerline.

1 7. The communications system of claim 6 in which said dielectric is
2 air.

1 8. The communications system of claim 6 in which said inner and
2 outer spaced plates are coaxially disposed about said a.c. powerline.

1 9. The communications system of claim 6 further including n
2 additional plates electrically connected to said inner coaxial plate to reduce noise.

1 10. The communications system of claim 9 in which said n additional
2 plates each have a surface area approximately $\frac{1}{n}$ of the surface area of said outer plate.

1 11. The communications system of claim 1 in which said means for
2 reactively coupling includes an inductor.

1 12. The non-invasive powerline communications system of claim 1 in
2 which said means for receiving includes means for reactively coupling said
3 communication signals on said powerline at said second location.

1 13. The non-invasive powerline communications system of claim 12 in
2 which said means for reactively coupling includes means for capacitively coupling said
3 communication signals on said powerline.

1 14. The non-invasive powerline communications system of claim 13 in
2 which said means for capacitively coupling includes a capacitor having inner and outer
3 spaced plates located proximate said powerline and a dielectric disposed between said
4 plates for capacitively coupling said communication signals to said powerline.

1 15. The communications system of claim 14 in which said dielectric
2 is air.

1 16. The communications system of claim 14 in which said inner and
2 outer spaced plates are coaxially disposed about said a.c. powerline.

1 17. The communications system of claim 14 further including n
2 additional plates electrically connected to said inner coaxial plate to reduce noise.

1 18. The communications system of claim 17 in which said n additional
2 plates each have a surface area approximately $\frac{1}{n}$ of the surface area of said outer plate.

1 19. The non-invasive powerline communications system of claim 12 in
2 which said means for reactively coupling includes means for inductively coupling said
3 signals to and from said powerline.

1 20. The non-invasive powerline communications system of claim 19 in
2 which said means for inductively coupling includes a communications core element
3 disposed about the said powerline and a plurality of windings disposed about said
4 communications core element for coupling said communication signals to and from said
5 powerline.

1 21. The non-invasive powerline communications system of claim 1
2 further including means for extracting from said powerline said communication signals
3 transmitted from said second location.

1 22. The non-invasive powerline communications system of claim 21 in
2 which said means for extracting includes means for reactively coupling from said
3 powerline said communication signals transmitted from said second location.

1 23. The non-invasive powerline communications system of claim 22 in
2 which said means for reactively coupling from said powerline said communication signals
3 transmitted from said second location includes means for inductively coupling from said
4 powerline said signals transmitted from said second location.

1 24. The non-invasive powerline communications system of claim 23 in
2 which said means for inductively coupling includes a communications core element
3 disposed about the powerline and a plurality of windings disposed about said
4 communications core element.

1 25. The non-invasive powerline communications system of claim 22 in
2 which said means for reactively coupling includes means for capacitively coupling from
3 said powerline said communication signals transmitted from said second location.

1 26. The non-invasive powerline communications system of claim 25 in
2 which said means for capacitively coupling includes a capacitor having inner and outer
3 spaced plates located proximate said powerline and a dielectric disposed between said
4 plates.

1 27. The communications system of claim 26 in which said dielectric
2 is air.

1 28. The communications system of claim 26 in which said inner and
2 outer spaced plates are coaxially disposed about said a.c. powerline.

1 29. The communications system of claim 26 further including n
2 additional plates electrically connected to said inner coaxial plate to reduce noise.

1 30. The communications system of claim 29 in which said n additional
2 plates each have a surface area approximately $\frac{1}{n}$ of the surface area of said outer plate.

1 31. The non-invasive powerline communications system of claim 1
2 further including means for encoding said communication signals.

1 32. The non-invasive powerline communications system of claim 4 in
2 which said means for inductively coupling further includes driver means for providing
3 low voltage, high current pulses of said communication signals to said plurality of
4 windings to inductively couple said pulses to said powerline.

1 33. The non-invasive powerline communications system of claim 1
2 further including a storage device proximate said first location.

1 34.

2 The non-invasive powerline communications system of claim 33
3 further including means for transmitting said communications signals to said storage
device.

1 35.

A non-invasive powerline communications transmitter, comprising:

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means for generating communication signals for transmission on

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a powerline; and

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means for reactively coupling said communication signals to said

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powerline.

1 36. A non-invasive powerline communications receiver for receiving
2 communication signals transmitted over a powerline, comprising:

3 means for receiving the communication signals transmitted over the
4 powerline; and

5 means for reactively coupling the communication signals from the
6 powerline to said receiver.

1 37. A non-invasive powerline communications system comprising:
2 a sensor for sensing a condition of a powerline;
3 a base station remote from the sensor;
4 means for reactively coupling a signal from the sensor onto the
5 powerline for transmission to the remote base station;
6 means for reactively coupling said signal transmitted on the
7 powerline from the powerline to the remote base station;
8 means for reactively coupling a signal generated by the base station
9 onto the powerline; and
10 means for reactively coupling the signal on the powerline from the
11 base station to the sensor.

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